ADVANCED FUEL CYCLE (AFC) FIVE-YEAR PROGRAM PLAN

Kemal O. Pasamehmetoglu

AFC Fuels Development

Technical National Director

Los Alamos National Laboratory

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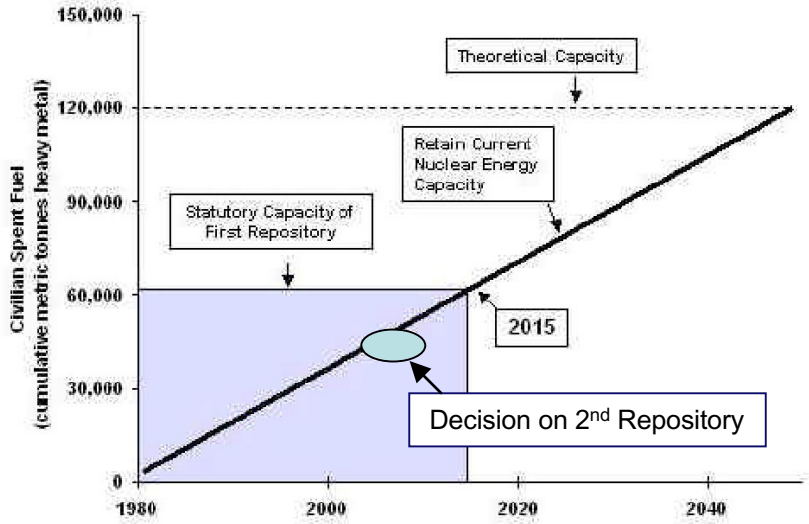
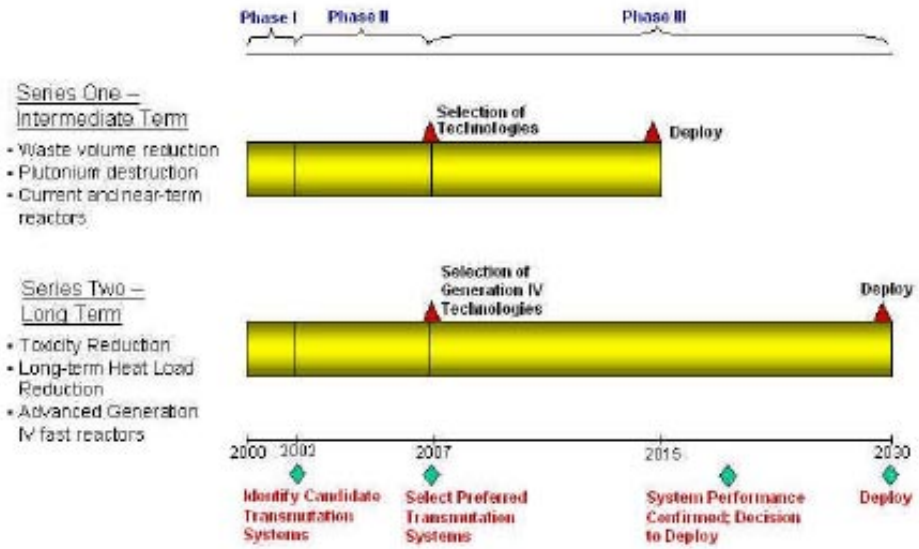
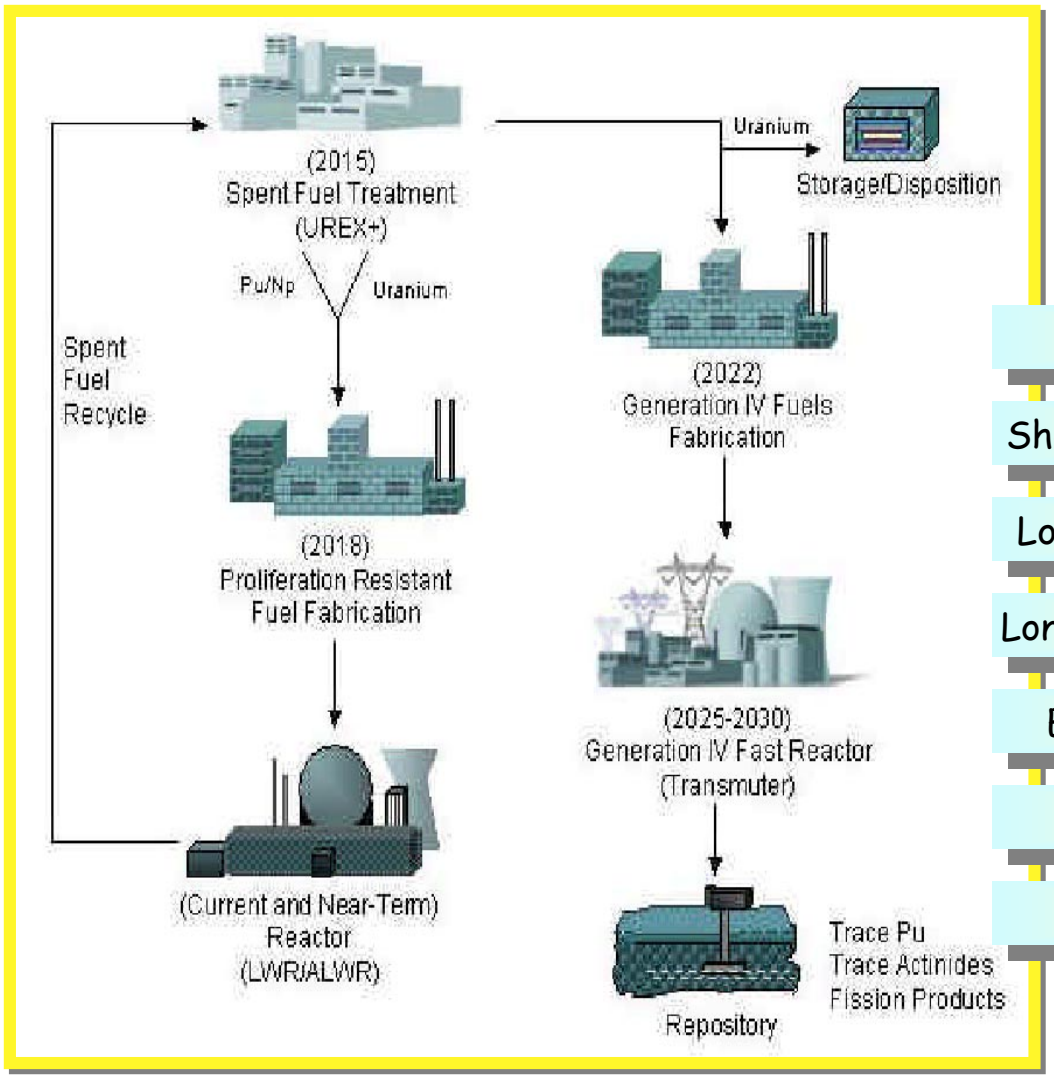
AFC program is designed to address the fuel cycle issues within the framework of repository performance and the needs of GEN IV systems





- The decision on the second repository must be made in the 2007-2010 timeframe.
  - The objective of the initial 5-year program is to eliminate the need for this decision.
- The first repository will reach its statutory capacity by 2015.
  - The longer term objective is to eliminate or delay the need for the 2nd repository while maintaining a sustainable nuclear energy production.
    - Transition to GEN IV systems

The fuel cycle for the AFC is implemented in two series, both of which are essential for a closed fuel cycle.



	Series I	Series II
Volume reduction	✓	
Short-term decay heat	✓	
Long-term decay heat		✓
Long-term proliferation	✓	✓
Environmental risk	✓	✓
Radio-toxicity		✓
Criticality	✓	✓

The future nuclear energy mix may contain considerable number of fast-reactors.

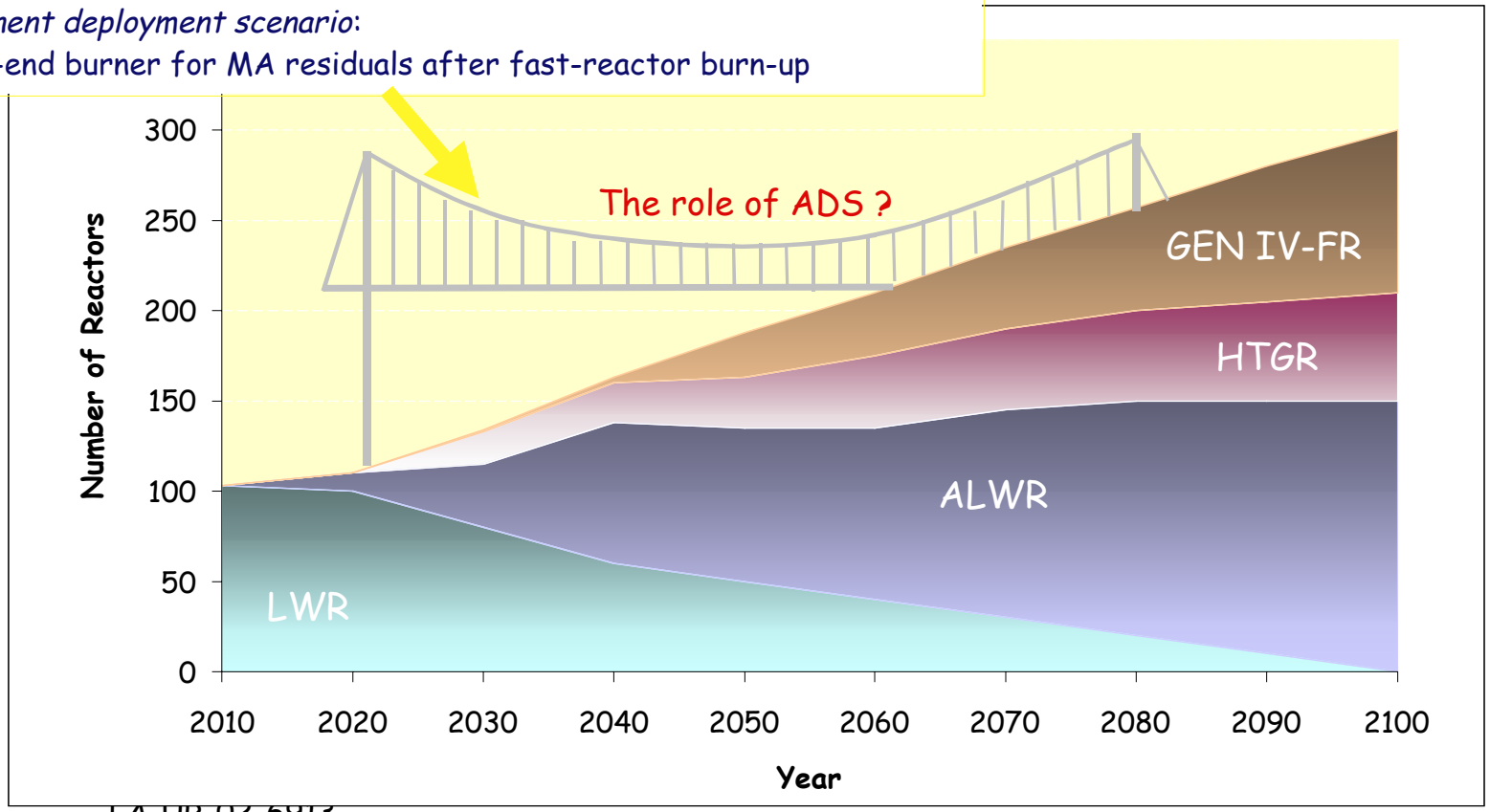
ADS may play a bridging role in the transition to GEN-IV fuel cycle:

Temporary deployment scenario:

- MA burner until GEN-IV infrastructure is established
- Provide a test bed and help develop GEN-IV reactor technologies

Permanent deployment scenario:

- Back-end burner for MA residuals after fast-reactor burn-up



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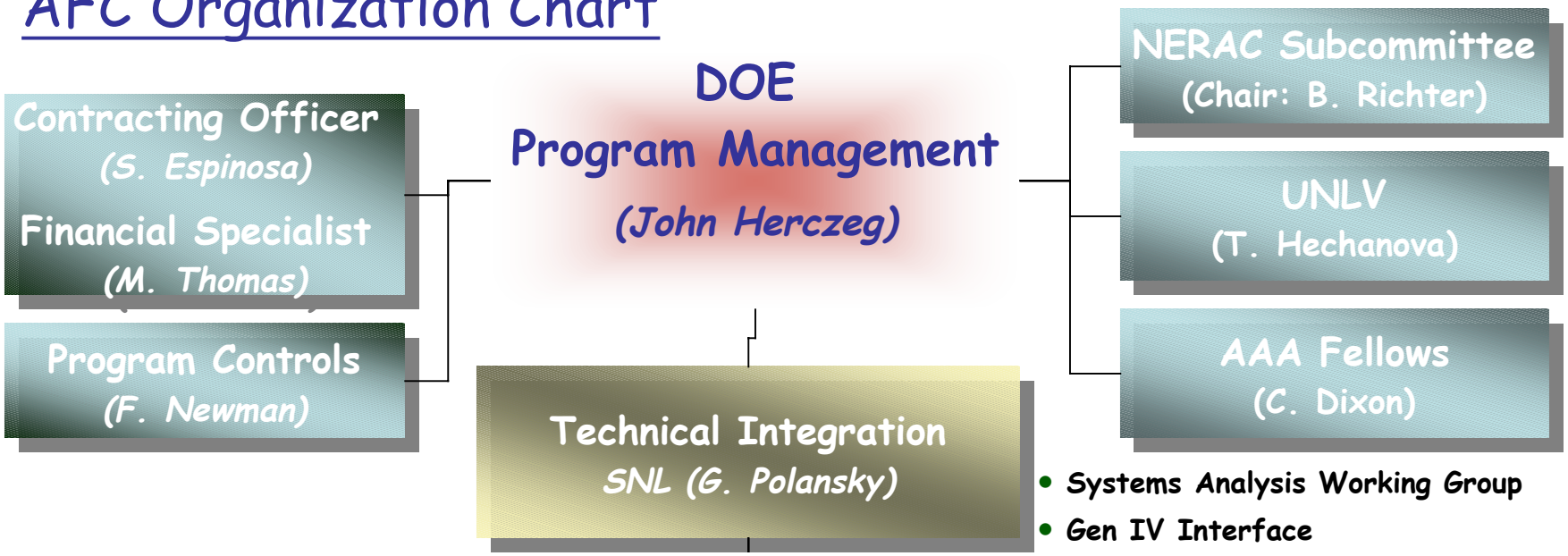
AFC Organization Chart



Series I
- (U,Pu,Np)oxide
- Facility design & requirements

Series II
- Metal
- Nitride
- Oxide
- TRISO
- Dispersion

Series I
- UREX
- PYROX
- Advanced Concepts
- Facility des. & requirements

Series II
- Pyro chemical
- Hydrochemical
- Advanced Concepts

Series II
- Physics (codes and data)
- Materials & Coolants
- ADS

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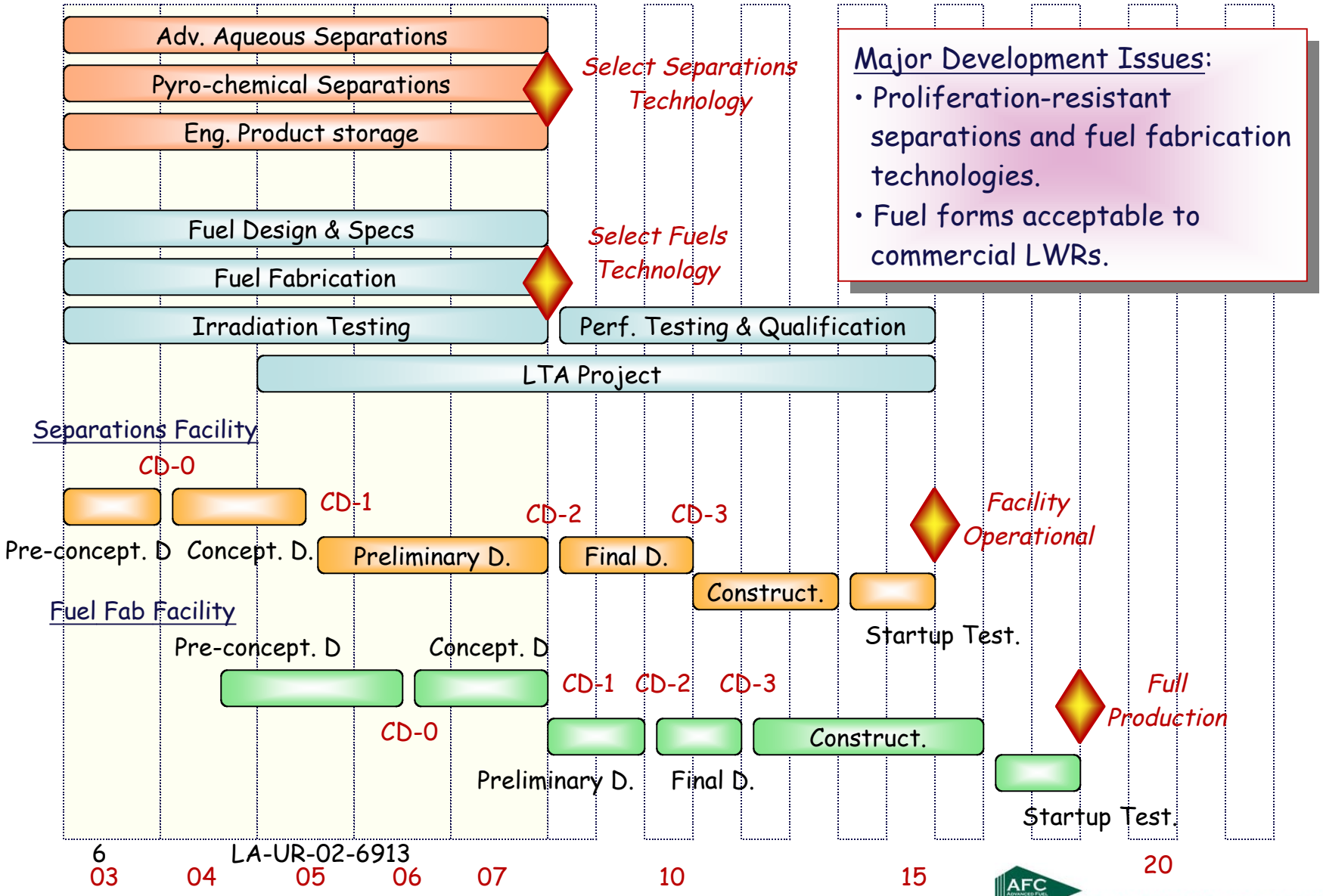
In Series I some R&D work will continue along with engineering implementation.



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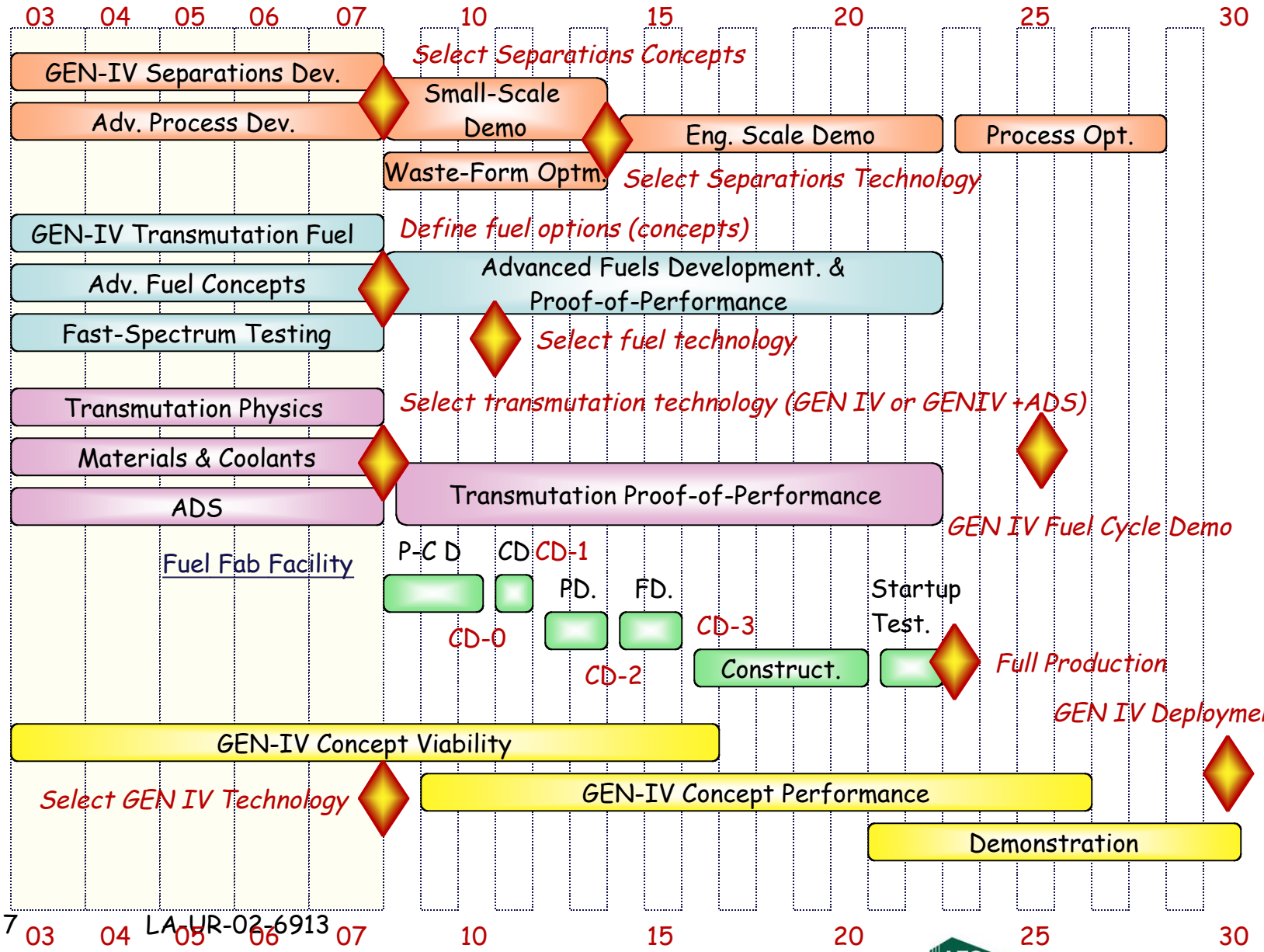
Series II requires further R&D.



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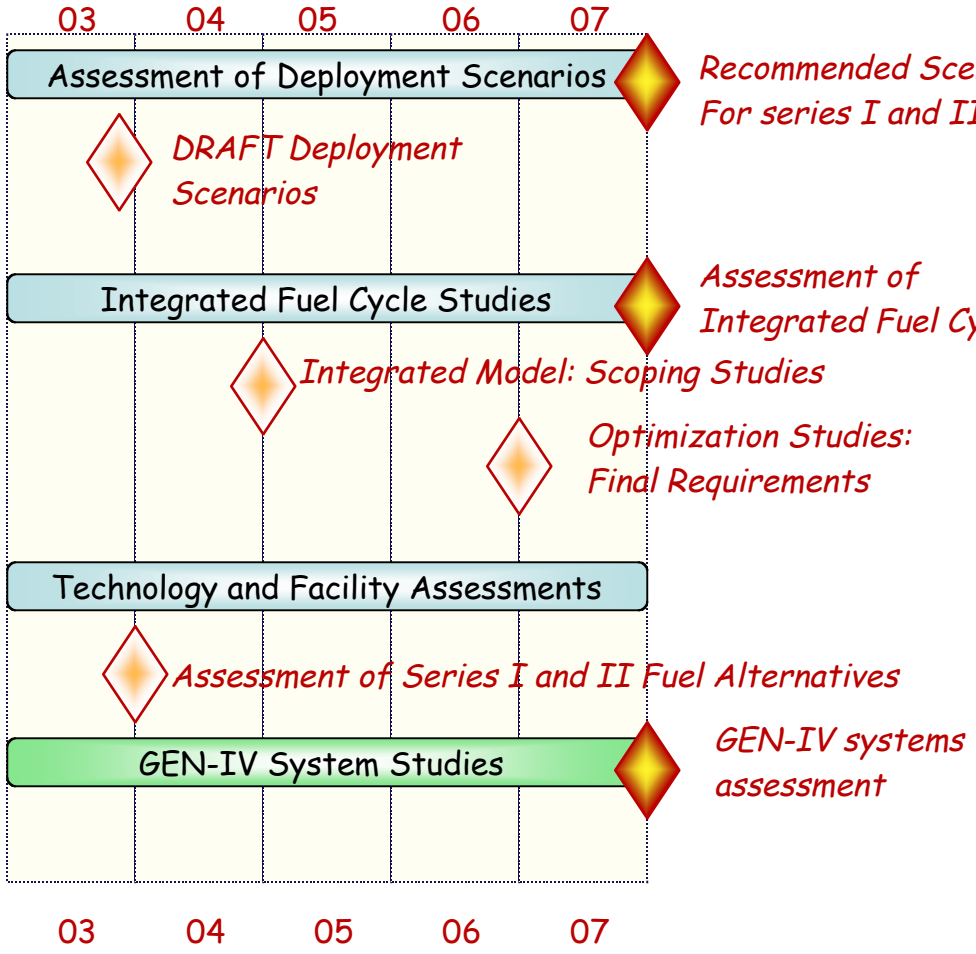
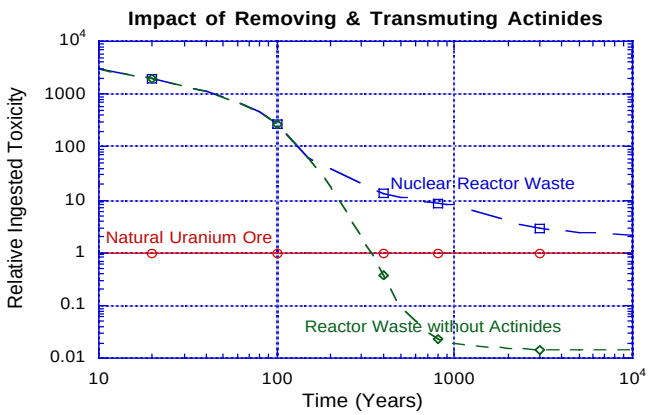
R&D and decisions will be guided by systems studies



Decision metrics

- Cost
- Waste volume
- Short-term and long-term heat load
- Proliferation
  - Plutonium inventory
- Radio-toxicity
- Environmental impact
- Resource availability



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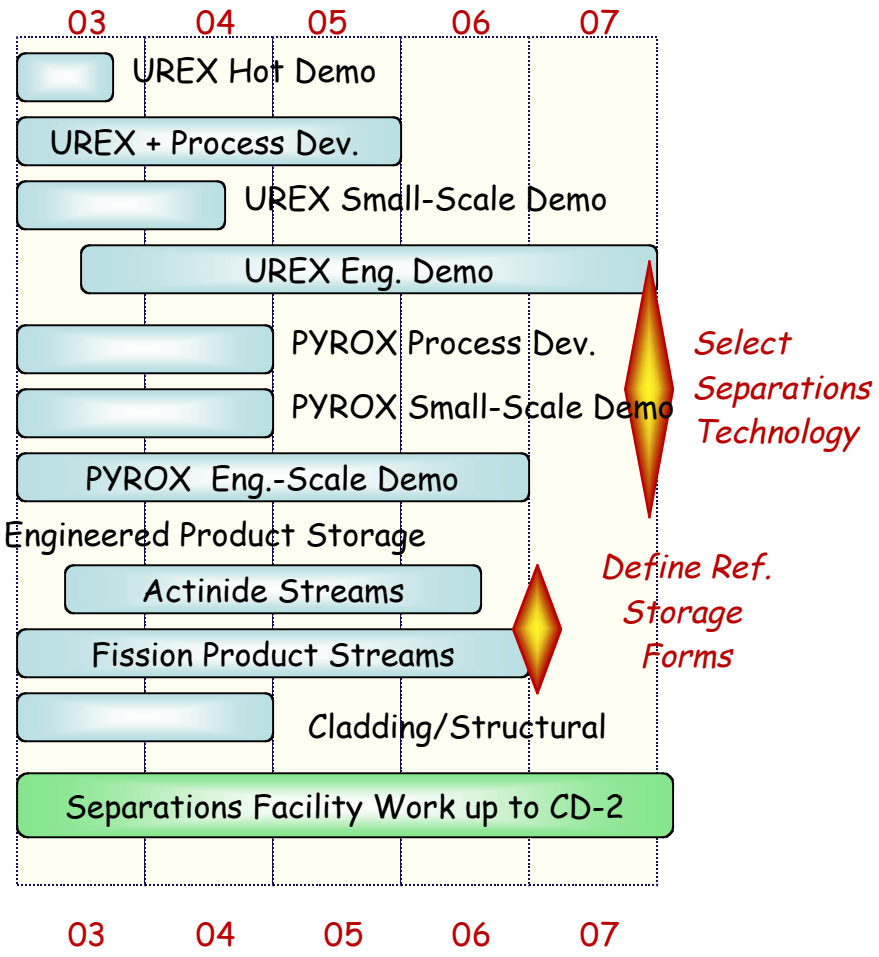
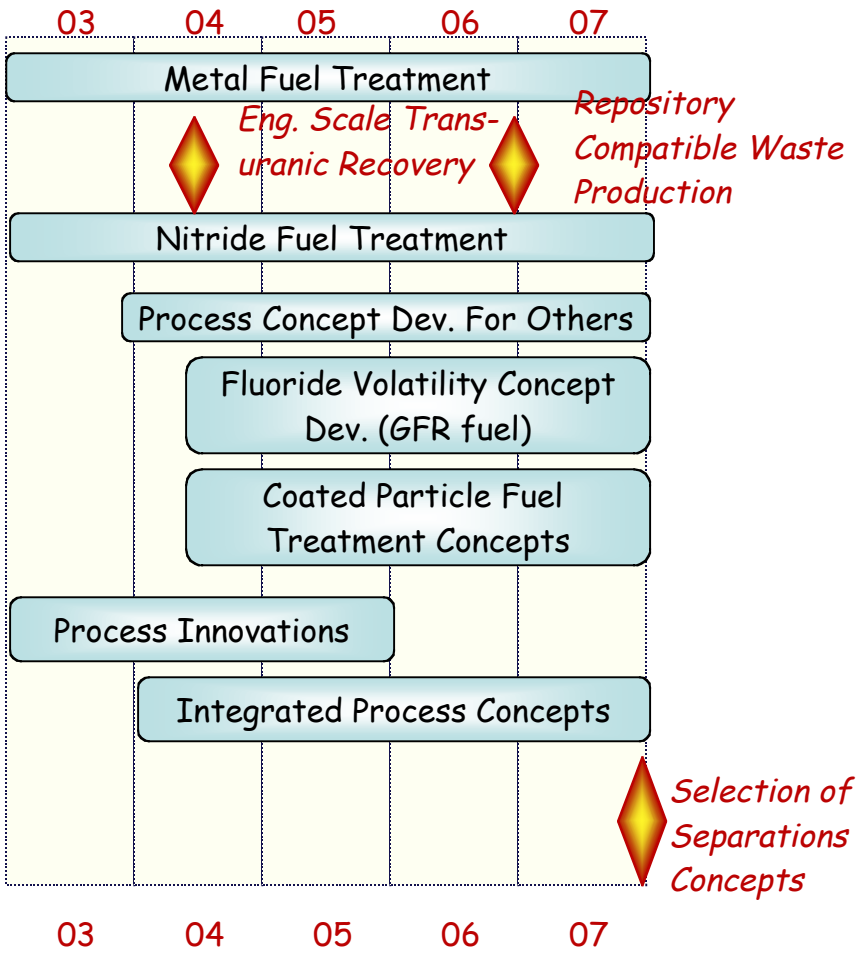
Separations development address the short-term and long term needs for both Series I and II





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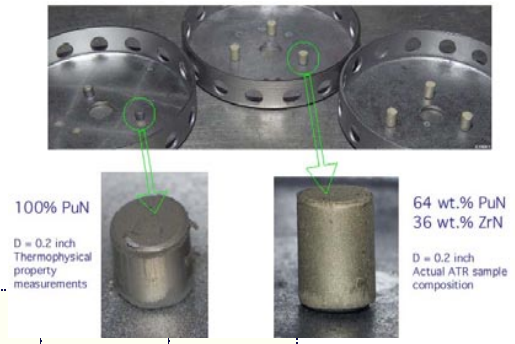
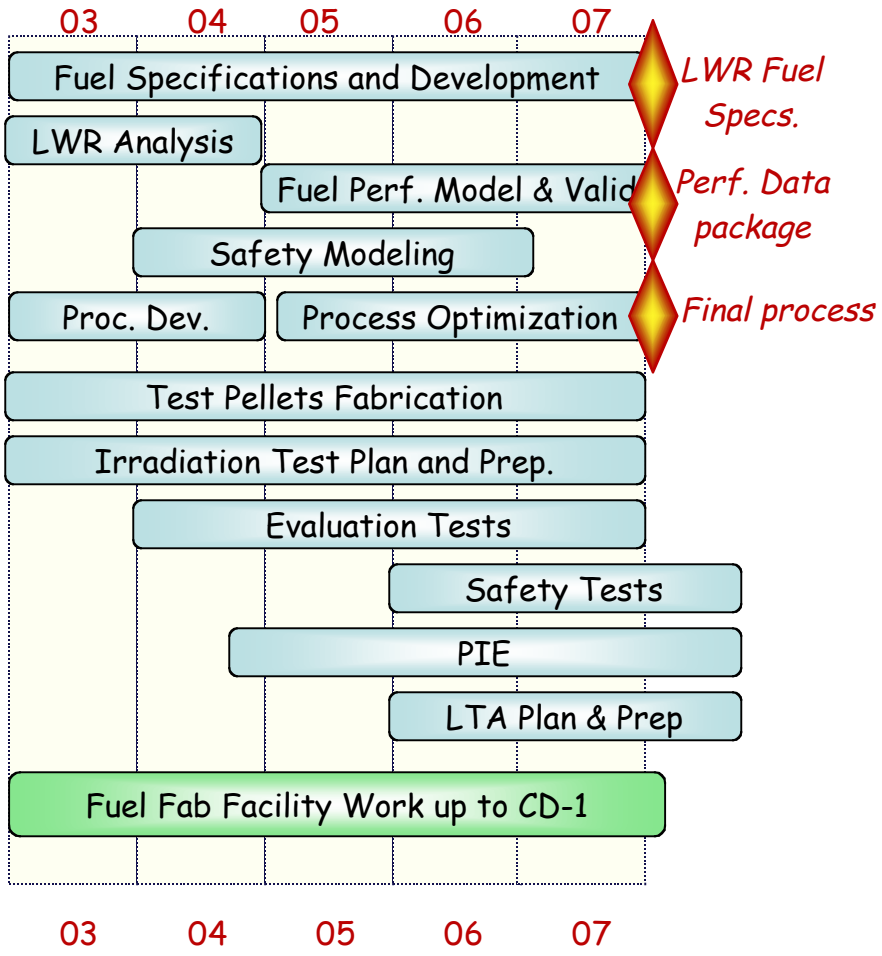
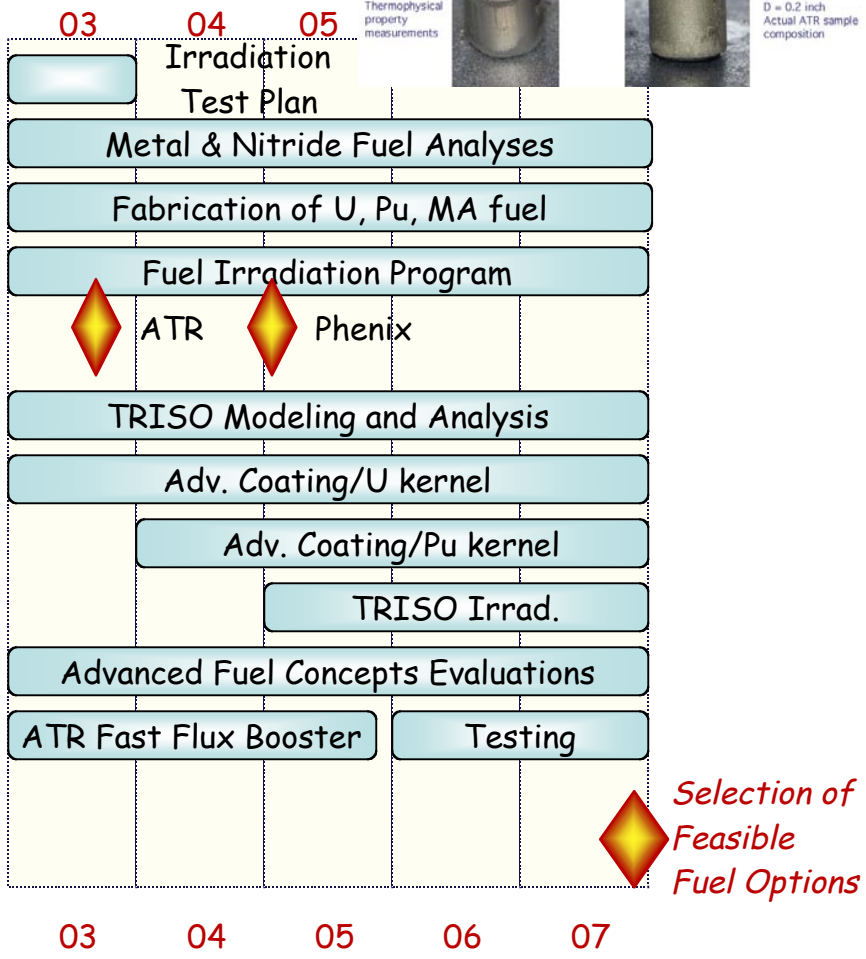
Short-term efforts are aimed at Pu containing fuels,
the long-term objective is to develop MA containing fuels.





SERIES I



SERIES II

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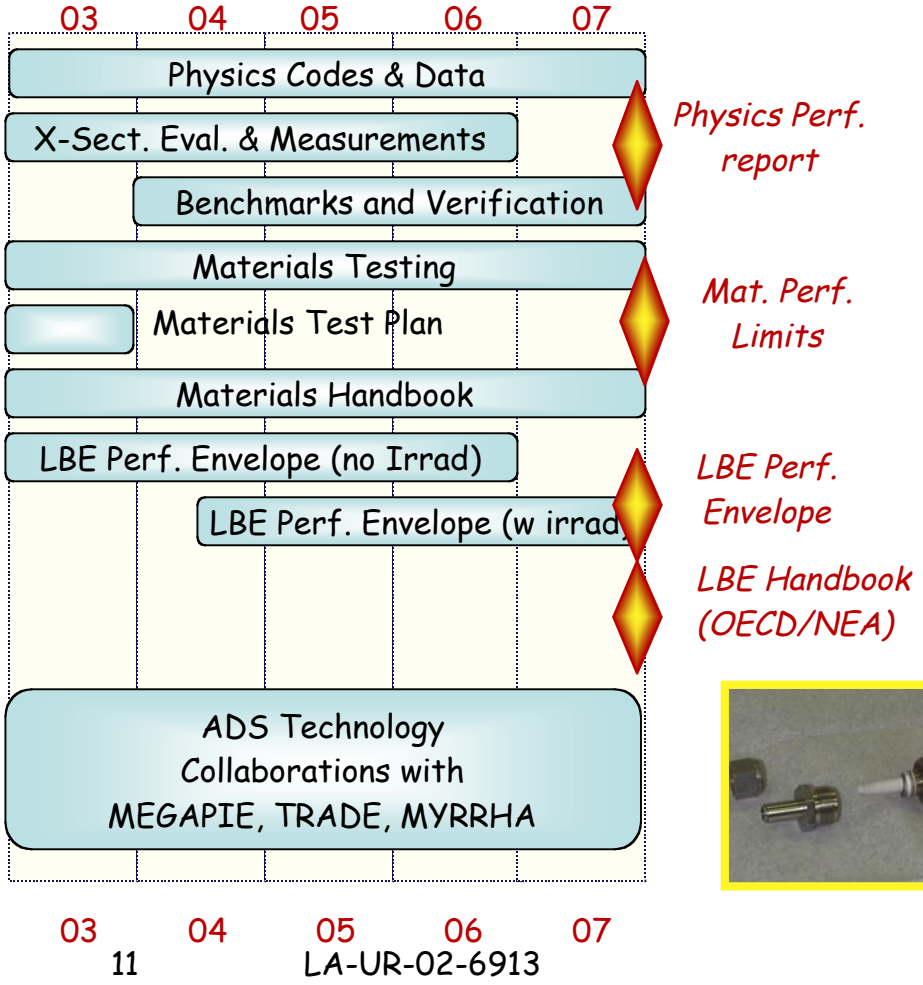
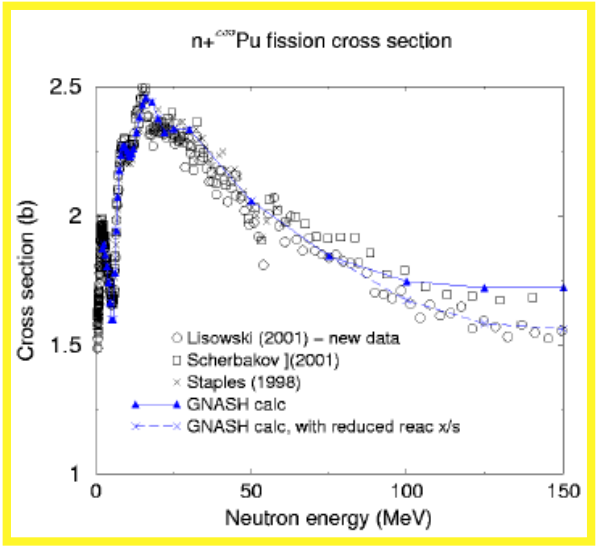
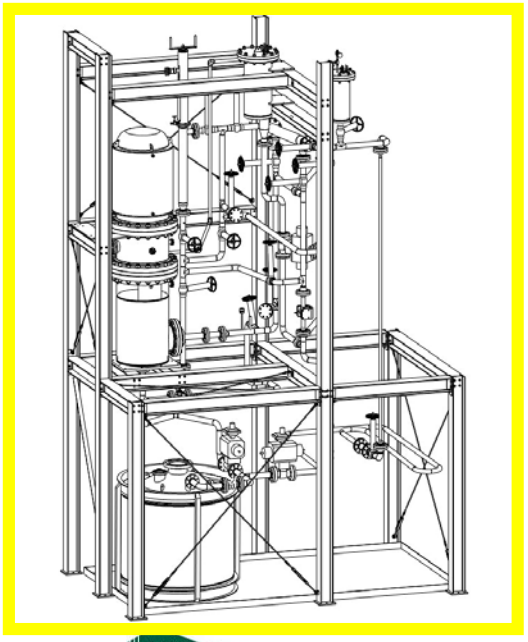
Research on transmutation engineering focuses on Series II technology development.







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ADVANCED FUEL CYCLE INITIATIVE

In FY03, all the high-priority research areas are being addressed.

Separations

Series I
- Advanced Aqueous
- Pyrochemical
- Engineered Product Storage
- Facility Design

Series II
- Fuel treatment processes
- Advanced concepts

Fuels

Series I
- Fuel Design and Specs
- Fuel Fabrication
- Irradiation Tests

Series II
- Nitride
- Metal
- TISO
- Advanced fuel concepts
- Fast fluix Irradiation Facility

Transmutation

- Physics (codes and data)
- Structural materials
- LBE technology
- ADS collaboration
- University support